NUMBER 26

Proceedings

of

The Canadian Phytopathological Society

Twenty-fifth Session

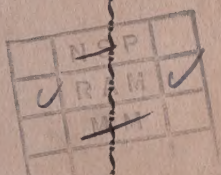
JUNE 23-26, 1958

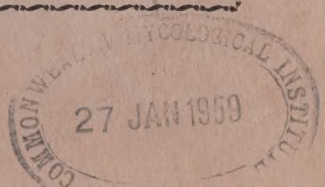
ACADIA UNIVERSITY

WOLFVILLE, NOVA SCOTIA

JAN 5 1959

Editorial Committee
JEAN E. SHORTEN (Chairman)
V. R. WALLEN
R. A. SHOEMAKER
D. S. MacLACHLAN





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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL

1957-58

President

A. J. SKOLKO, Botany and Plant Pathology Division, Ottawa, Ont.

Vice-President

M. W. CORMACK, Canada Agriculture Research Laboratory, Saskatoon, Sask.

Secretary-Treasurer

D. S. MacLACHLAN, Botany and Plant Pathology Laboratory, Ottawa, Ont.

Councillors

D. R. REDMOND, Forest Research Divison, Department Northern Affairs and National Resources, Ottawa, Ont.

R. E. FITZPATRICK, Plant Pathology Laboratory, Vancouver, B. C.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer, Dr. R. L. Millar, Botany and Plant Pathology Laboratory, Science Service, Canada Department of Agriculture, Ottawa, Ontario. The price of single copies is 50c.

ANNUAL MEETING

C.P.S. Acadia University, Wolfville, N.S.

June 23-26, 1958

Front row : L. to R. — **J. H. Craigie, J. G. Horsfall, A. J. Skolko, D. S. MacLachlan, R. G. Ross.**

Second row : — **W. Hodgson, J. P. MacKinnon, W. L. Gordon, L. W. Koch, W. E. Sackston, H. van Groenewoud.**

Third row : — **W. P. Campbell, J. Reid, D. Brewer, R. C. Russell, B. H. MacNeill, S. Fushtey.**

Fourth row : — **W. G. Kemp, J. E. Campbell, H. Lawrence, J. C. Hopkins, L. V. Busch, O. A. Olsen, G. W. Ayers, V. Clarke, G. Ward.**

Fifth row : **R. H. Estey, L. Cinq Mars, H. Genereux, K. Harrison.**

MINUTES OF THE TWENTY-FIFTH MEETING HELD AT ACADIA UNIVERSITY, WOLFVILLE, N. S. JUNE 23-26, 1958

Business Sessions: June 23 and June 26.

The Society meetings and business sessions were held in University Hall, Acadia University. Dr. A. J. Skolko welcomed the members and visitors to the twenty-fifth annual meeting of the Society, and in a brief address outlined the progress of the Society through the past year.

The minutes of the twenty-fourth meeting were adopted as printed in Proceedings No. 25, on a motion by W. P. Campbell, seconded by H. Genereux. Carried.

It was moved by B. H. MacNeill, seconded by L. V. Busch that the chair be empowered to appoint members to existing committees and to name a nominating committee and a resolutions committee.

The report of the Secretary-Treasurer was adopted on a motion by D. S. MacLachlan, seconded by L. W. Koch. Carried.

The report of the Editorial Committee was adopted on a motion by D. S. MacLachlan, seconded by W. E. Sackston. Carried.

The report of the Terminology Committee was read by M. F. Welsh. Following discussion it was moved by M. F. Welsh, seconded by B. H. MacNeill that the report on "Terminology in Plant Virus Diseases" should be published in the Canadian Journal of Plant Science with a note in Phytopathology. Carried.

The report of the Program and Publicity Committee was adopted on a motion by R. G. Ross, seconded by J. Munro. Carried.

The report of the representative to the Canadian Society of Microbiologists was adopted on a motion by A. R. Walker, seconded by R. Estey. Carried.

The following applications for membership in the Society were approved unanimously on a motion by L. W. Koch, seconded by W. P. Campbell: T. H. Smith, John C. Hopkins, P. E. Udeaja, C. L. Lockhart, C. O. Gourley.

The report of the nominating committee was adopted on a motion by D. S. MacLachlan, seconded by W. Hodgson.

The report of the Resolution Committee was adopted on a motion by M. F. Welsh, seconded by L. V. Busch.

It was moved by W. P. Campbell, seconded by L. V. Busch, that in view of the fact that the IXth International Botanical Congress is to be held in Montreal in 1959, the C.P.S. should not hold an annual meeting that year. Carried.

The subject of the affiliation of the Canadian Phytopathological Society with the Agricultural Institute of Canada or with another Canadian Biological Society was introduced by A. J. Skolko. Dr. H. A. Senn outlined the progress which has been made to date in the formation of a Canadian Biological Society. Following a lengthy discussion, it was moved by D. S. MacLachlan, seconded by W. P. Campbell that the incoming executive should make every effort to be represented at meetings called to organize a Biological Society, and that they should keep the C.P.S. membership informed of developments. Carried.

The possibilities of publishing abstracts of regional meetings of the Society in the Society's Proceedings was discussed. This matter was referred to the incoming executive for consideration.

COMMITTEES

Auditors: Mildred K. Nobles and J. W. Groves.

Editorial: Jean Shorten (Chairman), V. R. Wallen, R. A. Shoemaker, R. L. Millar.

Nominating: A. J. Skolko (Retiring President as Chairman), R. E. Fitzpatrick, G. W. Ayres, L. W. Koch, B. Sallans.

Program and Publicity: B. H. MacNeill (Chairman), L. V. Busch, R. L. Millar.

Representative to the Canadian Society of Microbiologists: A. R. Walker.

Resolutions: W. E. Sackston (Chairman), K. A. Harrison.

Terminology: M. F. Welsh (Chairman), W. A. F. Hagborg, B. H. MacNeill, H. M. Good, T. C. Vanterpool, R. S. Willison, R. A. Ludwig, C. D. McKeen, D. J. MacLeod, R. Pomerleau, L. E. Tyner, A. W. Henry, A. N. Langford.

Regional Representatives:

Maritimes	—	J. Munro
Eastern Quebec	—	D. Leblond
Western Quebec	—	F. Godbout
Eastern Ontario	—	R. J. Baylis
Western Ontario	—	B. H. MacNeill
Manitoba	—	W. C. McDonald
Saskatchewan	—	R. D. Tinline
Alberta	—	E. J. Hawn
B. C. Mainland	—	R. Stace-Smith
Vancouver Island	—	R. E. Foster

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:

I have the honor of presenting the following report for the fiscal year ending May 31, 1958.

The twenty fourth Annual Meeting of the Society was held at the University of British Columbia, Vancouver, B. C., June 24-27, 1957. An account of the business sessions, and abstracts of the 24 papers presented are included in C.P.S. Proceedings No. 25.

The C.P.S. Banquet was held at the University of British Columbia. The guest speaker on this occasion was Dr. H. T. Güssow, former Dominion Botanist, who recalled his experiences in establishing the Botany and Plant Pathology Division in Canada.

Membership in the Society now stands at 228.

The attached financial statement shows a favorable balance of $335.68, as compared to $169.63 in 1957. We also have a Dominion of Canada Bond in the amount of $500.00.

Respectfully submitted,

D. S. MacLachlan,

Secretary-Treasurer.

FINANCIAL STATEMENT

CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1957 to May 31, 1958

Revenue :

Balance brought forward			$169.63
Fees :			
1952-53	$ 2.00		
1953-54	2.00		
1954 55	4.00		
1955-56	18.00		
1956-57	122.00		
1957-58	300.00		
1958-59	34.00		
1959-60	4.00		
		$486.00	
Bond interest		15.00	
Sale of Proceedings		4.00	
Refund from Dr. Yarwood's expenses		125.00	
			630.00
			799.63

Expenditures :

Dr. Yarwood's expenses		125.00	
Honoraria — Stenographic			
Vancouver 1956		10.00	
Ottawa 1956-57		15.00	
Ottawa 1957-58		15.00	
Printing of Proceedings #25		217.80	
Reprints Can. J. Botany		18.60	
Stamps and Stationery		57.60	
Printing of banquet tickets		4.95	
			463.95
			335.68
Bank balance May 31, 1958	331.99		
Cash on hand	3.69		
	335.68		

Additional Asset :

Dominion of Canada Bond (Series P7Z95546)	500.00

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the twenty-fourth session of the Canadian Phytopathological Society was issued on November 18, 1957. It contains the report of the meeting held at the University of British Columbia, Vancouver, B.C., June 24-27, 1957, abstracts of twenty-four papers presented at the meetings, a list of papers published by members of the Society between June 1, 1956 and May 31, 1957, and an obituary of Mr. Walter Jones. No photograph of the members attending the meeting was available. It is hoped that a photograph will be taken at subsequent meetings as it provides an interesting record.

The advance printing of abstracts of papers presented at the meeting facilitated earlier publication of the Proceedings. A good response was received to the request for the list of papers published. As in the last two issues of the Proceedings, only the references actually sent in by members were included in the list of papers published by members of the society.

R. A. Shoemaker
V. R. Wallen
D. S. MacLachlan
Jean E. Shorten (Chairman).

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee of the Canadian Phytopathological Society has agreed unanimously on the following nominations to office for the year 1958-59 :

President :	M. W. Cormack
Vice-President :	W. E. Sackston
Secretary Treasurer :	R. L. Millar
Councillors :	A. J. Skolko
	H. Genereux

Respectfully submitted

R. O. Lachance
D. B. Robinson
W. L. Gordon
W. F. Hanna
R. E. Fitzpatrick (Chairman).

REPORT OF THE PROGRAM AND PUBLICITY COMMITTEE

The committee for the arrangements of the 1958 C.P.S. meetings in Wolfville, N.S. were : G. W. Ayers and D. B. Robinson, Charlottetown; J. Munro, Fredericton; D. S. MacLachlan, Ottawa and R. G. Ross (Chairman), Kentville. The committee held meetings at Charlottetown and Ste. Anne de la Pocatiere to arrange the program.

In addition to the 17 papers presented by members of the society a symposium entitled "Tree fruit disease control", was included in the program. The special guest speaker was J. G. Horsfall, New Haven, Conn., who gave an invitation paper, "The mechanism of fungicidal action of captan." Other speakers were G. C. Chamberlain, St. Catharines, Ont., and L. Cinq-Mars, St. Jean, Que. R. G. Ross, Kentville, N.S., acted as chairman. Another deviation from the usual program was the paper presented by R. Gander, Wilde Heerbrugg Ltd., Switzerland, entitled, "Photomicrography and microcinematography."

The annual banquet of the Society was held at the Paramount Hotel in Wolfville. Dr. F. W. Walsh, Deputy Minister, Nova Scotia Department of Agriculture and Marketing was the guest speaker.

An invitation was extended to the members of the Northeastern Division of the American Phytopathological Society to attend the C.P.S. meetings.

The committee expresses its appreciation to the Program Committee of the A.I.C. for their co-operation in making local arrangements.

R. G. Ross (Chairman).

REPORT OF THE REPRESENTATIVE TO THE CANADIAN SOCIETY OF MICROBIOLOGISTS

The Eighth Annual Meeting of the Canadian Society of Microbiologists was held at Dalhousie University, Halifax, June 18-21, 1958.

Twenty papers were presented and a Symposium with four speakers was held on "Preservation of Food from Microbial Spoilage".

The Society continues in a healthy condition. There are 379 paid up members and there was a bank balance of $2917.88 on June 1.

The Journal too continues to thrive. There are now 1258 subscribers compared with 1176 last year and 750 two years ago. The 3rd volume contained 114 papers with a total of 1029 pages. The subscription rate for non-members has been increased to $6.00. However the membership fee of $6.00 still includes subscription to the Journal.

Application for incorporation of the Society is nearing completion. The incorporation papers were signed at the council meeting at Dalhousie.

Plans are well in progress for the 8th meeting of the I.A.M.S. at Montreal August 19-24, 1962. These are tentative arrangements pending acceptance of Canada's invitation by the Stockholm meetings this year.

Dr. Freedette is President-elect and Professor J. A. Carpenter is Secretary-Treasurer.

The 1959 meetings are scheduled for Quebec in June — tentative dates 14, 15, 16, 17. The 1960 meetings are planned for Guelph, Ontario.

Respectfully submitted,

A. R. Walker.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas the Canadian Phytopathological Society has held its 25th session at Acadia University, Wolfville, N.S. June 23-26, 1958, in conjunction with the annual meeting and convention of the Agricultural Institute of Canada, and whereas the accommodations and facilities placed at the disposal of the Society have contributed notably to the success of the sessions.

Be it resolved that we extend our sincere appreciation to :

1. Our hosts, the Kentville Branch of the Agricultural Institute of Canada.
2. Acadia University for making available their facilities.
3. Dr. R. G. Ross, Chairman, and members of the Program Committee for arranging all details of the meetings, and for the Annual Banquet at the Paramount Hotel.
4. Dr. F. W. Walsh, Deputy Minister, Nova Scotia Department of Agriculture and Marketing, for his address presented at the Annual Banquet.
5. Dr. J. G. Horsfall, for his invitation paper, "The mechanism of fungicidal action of captan", and to Mr. G. C. Chamberlain and Mr. L. Cinq-Mars, for their invitation papers in the symposium on tree fruit disease control.
6. It is resolved that the Society extend its best wishes to the following members on the occasion of their retirement: Mr. H. N. Racicot, Mr. K. Richardson and Dr. W. Newton.

W. E. Sackston (Chairman).
K. A. Harrison

REPORT OF THE TERMINOLOGY COMMITTEE

The review, "Definitions of Terms in Forest and Shade Tree Diseases", was published, as anticipated, in the September, 1957 issue of the Canadian Journal of Botany, with reprints issued to the secretaries of the Society and the Canadian Institute of Forestry.

The review of terminology in plant virus diseases has been revised, incorporating suggestions offered by members of the Committee on Nomenclature and Classifi-

cation of Plant Viruses of the American Phytopathological Society, and by other U.S. workers. This revision is ready for circulation to members of the C.P.S. Terminology Committee. If it receives general approval it will be submitted as a manuscript for publication.

U. S. Workers have queried the possibility of having the review published in Phytopathology or Plant Disease Reporter.

W. A. F. Hagborg
B. H. MacNeill
H. M. Good
T. C. Vanterpool
R. S. Willison
R. A. Ludwig
W. E. McKeen
C. D. McKeen
D. J. MacLeod
R. Pomerleau
L. E. Tyner
A. W. Henry
A. N. Langford
M. F. Welsh (Chairman).

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-FIFTH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

CLUBROOT RESISTANCE IN SWEDE AND CABBAGE

G. W. Ayers, Science Service Laboratory, Charlottetown, P.E.I.

Studies on physiologic specialization in the clubroot organism have shown that inocula of different geographic origins may exhibit variation in pathogenicity to certain crucifers.

Complete clubroot susceptibility was demonstrated in Laurentian swede when exposed to inocula from the Maritime provinces but this variety proved immune to inocula from: Bradford, Ontario; Ste. Martine, Quebec; Keating and Cordova Bay, British Columbia. Wilhelmsburger swede proved susceptible to inocula from Nappan, Nova Scotia and Ste. Edwige, Quebec, but no clubbing was observed following exposure to inocula from several other points in Canada. A hybrid swede line bred for clubroot resistance at Nappan showed high resistance or immunity to all inocula except that gathered from the Nappan experimental farm.

Danish ballhead cabbage was susceptible to all inocula under test, while a cabbage line bred for clubroot resistance in Wisconsin was susceptible to certain inocula from Eastern Canada and resistant to those from Ontario and British Columbia.

The occurrence of two clubroot races was demonstrated in spore samples gathered at Nappan, Nova Scotia. Inoculum from Ditmars swedes was pathogenic on Wisconsin cabbage lines while inoculum from Wilhelmsburger swedes caused little or no clubbing on these lines.

SILVER SCURF OF MUCK POTATOES

L. V. Busch, Ontario Agricultural College, Guelph, Ontario.

Silver scurf of potatoes is particularly troublesome on tubers grown in muck soils. The disease increases in severity on tubers throughout the storage period. While this disease has undoubtedly been present for a long time it is only since the advent of washing and packing in polyethylene bags that the growers have expressed concern.

The relative effectiveness of 21 chemicals in preventing sporulation of *Helminthosporium atrovirens*, the causal agent of silver scurf, was evaluated in the laboratory. Discs of tissue, removed by means of a large cork borer from the surface of infected tubers, which had been treated just prior to the experiment with the various chemicals, were placed on top of damp quartz sand in petri dishes and examined one week later for sporulation. This technique permitted bulk testing of chemicals and a rapid evaluation of their action. Of the chemicals tested only Puraseed, Semesan Bel, Karathane, Terraclor and Manzate prevented sporulation without noticeable effect on the sprouting ability of the potatoes.

However, treating seed pieces with the above chemicals and planting them in soil which had previously grown potatoes did not control silver scurf. Undoubtedly, soil inoculum plays a large part in the epidemiology of this disease. This fact raises doubts as to the value of seed treatment for control with the possible exception that it may prevent the contamination of otherwise clean soil.

PATHOGENICITY STUDIES OF ISOLATES OF *SEPTORIA AVENAE* F. SP. *AVENAE*

R. V. Clark, Botany and Plant Pathology Laboratory, Ottawa, Ontario.

Single microspore, macrospore and macropycnidial isolates of *Septoria avenae* Frank f. sp. *avenae* were tested on several varieties of oats. In addition, comparisons were made among monomacrospore isolates from various locations across Canada, from several oat varieties grown at one location and from a single lesion on a leaf. All isolates regardless of origin were capable of causing infection and the oat varieties studied showed no differential reaction. However, all isolates including those obtained from a single leaf, showed a wide variation in virulence ranging from weakly virulent to highly virulent. The isolates varied greatly in the production of macrospores on oat-leaf agar. In some cases the virulence of the isolates was dependent on the concentration of spores in the inoculum while others produced very few spores and were highly virulent. Macrospores from the microspore, macrospore and macropycnidial isolates showed considerable variability in such characters as spore length, width and number of septations.

NUCLEAR BEHAVIOUR IN THE DIPLOIDISATION OF HAPLOID INFECTIONS OF *PUCCINIA HELIANTHI*

J. H. Craigie, Botany and Plant Pathology Laboratory, Ottawa, Ontario.

Nuclei of *Puccinia helianthi* occur in two states — the expanded, or normal state of the resting nuclei; and the unexpanded, which results from nuclear division. At least the expanded nuclei possess true nucleoli. Daughter nuclei are at first unexpanded, but soon become expanded. Pycniospore nuclei, though originally daughter nuclei, fail to expand because of their isolation. When, however, through fusions of pycniospores and flexuous hyphae, they gain access to compatible mycelia, they soon undergo expansion. As expanded nuclei, they migrate to the basal region of the protoaecia, dividing only rarely along the way. There, by rapid successive divisions, they provide nuclei of pycniospore origin for the diploidisation of the protoaecia.

FLOWER PRODUCTION ASSOCIATED WITH INCREASED ROOT LESIONING IN RED CLOVER (*TRIFOLIUM PRATENSE* L.).

R. H. Estey, Macdonald College, Quebec.

Red clover plants which produced flowers under long-day conditions in the greenhouse had more root lesions than those which failed to produce flowers under short-day conditions, regardless of whether the soil in which they were grown had come from the root-zone of diseased clover or from a plot in which legumes had not been grown for more than twenty years. Field grown plants which produced flowers in the autumn had more root lesions in November, and were less "winter hardy" than those which failed to produce flowers during the short days of autumn.

STUDIES ON THE EPIDEMIOLOGY AND CONTROL OF THE DWARF BUNT DISEASE IN WINTER WHEAT.

S. G. Fushtey, Ontario Agricultural College, Guelph, Ont.

Some of the factors influencing the development of dwarf bunt on winter wheat were studied under field and laboratory conditions. In the field, tremendous

variation in disease incidence from one year to the next could not be accounted for but the results did show that late, shallow plantings of seed with the inoculum placed at the soil surface was most favorable for disease development. Repeated attempts to induce infection under controlled laboratory and greenhouse conditions were unsuccessful.

Disease control studies confirmed the effectiveness of chlorobenzene soil dressings in reducing dwarf bunt in the field. Only one of eight other chemicals tested gave any appreciable disease control. Chlorobenzenes were also found to be superior to other chemicals when used as seed dressings to destroy seed-borne inoculum.

HUMUS STERILIZATION BY GAMMA IRRADIATION

H. van Groenewoud, Plant Pathology Laboratory, Saskatoon, Sask.

Ordinary sterilization methods result in considerable changes in the chemical and physical nature of soil. Sterilization by gamma irradiation, which is known to produce very small changes, was tried. It was found to be more effective in dry than in moist humus. A dose of 2.5 x 10^6 rads was required for complete sterilization of dry humus. This dose had practically no effect on the action of Penicillin, Magnamycin, Neomycin, Erythromycin and Dihydrostreptomycin on *Staphylococcus*. The pH did not change in the soil as a result of irradiation, and the Redox potential was found to be very little affected at a dose of 2.5 x 10^6 rads. The sterilization of soil by gamma irradiation should be very well suited for the study of antagonism of micro-organisms in natural media.

A STUDY OF THE VIRUS STREAK COMPLEX IN TOMATOES

Hikmet Ismen and Blair H. MacNeill, Ontario Agricultural College, Guelph.

The streak disease of tomatoes has been found to be widely distributed in Ontario in both the field and greenhouse crops. Analyses of samples taken from the foliage and fruit of diseased plants indicate that the streak symptom is due, mainly, to the combined action of tobacco mosaic virus (TMV) and potato virus X (PVX). The severity of the disease in Ontario appears to be linked directly with the widespread prevalence of a strain of TMV which, perhaps, is peculiar to the area sampled. This new strain in combination with PVX is exceedingly virulent in comparison with the combination of PVX and Holmes' type-strain of TMV. It may be differentiated from the type-strain through the production of local lesions on the inoculated leaves of petunia, and its failure to become established systemically in that host.

The severity of streak from cultures consisting of the petunia local lesion strain (PLL) and PVX is mainly a function of the latter component, although disease expression may also be modified by the mineral nutrition of the tomato host, and the air temperature during the incubation period. Temperature frequently masks the effects of nutrition, and in some instances may even mask the presence of the viruses themselves.

CULTURAL STUDIES ON *ATROPELLIS PINIPHILA*

J. C. Hopkins, Forest Biology Laboratory, Calgary, Alberta.

Isolates of *Atropellis piniphila* were cultured from blue-black wood in cankers of several lodgepole pines in Alberta. Attempts to isolate from the reddish-brown incipient zone of the canker were unsuccessful, and subsequent examination of wood sections confirmed the absence of hyphae within it. Cultures originating from ascospores of *A. piniphila* were similar to those from cankers. Growth was slow on all media, but it was relatively rapid on oat-dextrose and soya-dextrose agars. The optimum temperature for growth occured at approximately 18°C.; it was slightly reduced at 10°C., and had ceased at 29°C. Studies on pH indicated an optimum value of 4.0. The influence of carbon and nitrogen concentrations was investigated, and a vitamin deficiency for thiamin was demonstrated.

VIRUS DISEASES OF RHUBARB IN ONTARIO

D. S. MacLachlan, Botany and Plant Pathology Laboratory, Ottawa, Ont.

Two new viruses of rhubarb have been isolated from rhubarb plants growing in the Horticulture Division plots at Ottawa. Rhubarb Virus I produces a severe mottle and rugosity on Ruby Red rhubarb. It produces systemic mottling in *Nicotiana tabacum, Nicotiana glutinosa* and *Datura stramonium* and local lesions on *Vigna sinensis* and *Beta vulgaris.* Rhubarb Virus II produces necrotic spots on Ruby Red rhubarb. The symptoms on *Nicotiana tabacum, Nicotiana glutinosa,* and *Datura stramonium* are similar to those produced by Rhubarb Virus I, but no local lesions are produced on either *Vigna sinensis* or *Beta vulgaris.*

AMINO ACID NUTRITION OF *HIRSUTELLA* SP. ISOLATED FROM THE SPRUCE BUDWORM (*CHORISTONEURA FUMIFERANA* (CLEM.))

D. M. MacLeod, Forest Insect Laboratory, Sault Ste. Marie, Ontario.

There is very little precise information on the growth requirements of entomogenous fungi in media of known composition. Further, previous studies had been carried out in stationary cultures. Quantitative comparative studies on the growth and nutrition of these organisms therefore were undertaken in submerged (shake) cultures in synthetic media as a background for more detailed investigations on their metabolism in relation to pathogenicity.

A *Hirsutella* isolate from the spruce budworm (*Choristoneura fumiferana* (Clem.)), tentatively identified as *Hirsutella gigantea* Petch, was selected as the test organism, since it grows very poorly on a basal medium of ammonium nitrate, mineral salts, and glucose. There is, however, a substantial increase in growth when materials such as nutrient broth, tryptone, beef liver extract, and malt extract are added to the basal medium.

In a chemically defined medium it was found that a wide assortment of carbohydrates can be utilized as a source of carbon, while L-glutamic acid is the only amino acid readily assimilated as a nitrogen source by this organism. Even with glutamic acid, however, good growth will only take place when heavy inoculum has been added to the experimental flasks, thus suggesting that there is a partial requirement for one or more unidentified growth factors.

An inoculum of approximately 0.2 percent was shown to be sufficiently large to give fairly uniform growth among replicates, and small enough that nutrients are not unnecessarily added to the experimental medium through the inoculum.

A PEA WILT DISEASE NEW TO ONTARIO

B. H. MacNeill and Helen Howard, Ontario Agricultural College, Guelph, Ontario.

A wilt condition in peas new to the canning areas of Ontario but of increasing prevalence during the past two years was determined to be the near-wilt disease caused by *Fusarium oxysporum* f. *pisi* race 2 (Lindf.) Snyder & Hansen. Diagnosis was based on the differential reaction of the pea varieties W. R. Perfection and New Era, the vascular locus of infection, and the characteristics of the fungus in culture. Experimentally the disease was found to be very severe at high soil temperatures (25-28°C.) but field data indicate that near-wilt in Ontario may be important at soil temperatures as low as 18-20°C. The variety New Era, although resistant to the disease, was shown to harbor the pathogen in the lower stem portion of the stele. In addition, soybean, garden beans, red clover and alfalfa were found to be invaded by the parasite without any outward expression of disease. It is suggested that since *F. oxysporum* f. *pisi* is capable of invading plants other than the susceptible pea host, competition in the soil may not be an important factor in the persistence of the near-wilt organism.

EFFECT OF CERTAIN CHEMICALS ON THE DEVELOPMENT OF PERITHECIA OF *VENTURIA INAEQUALIS*

R. G. Ross, Plant Pathology Laboratory, Kentville, Nova Scotia.

Some elements which occur in apple leaves were tested in the form of their metallic salts for their effect on the formation of perithecia of *Venturia inaequalis* in artificial culture. The formation of perithecia was inhibited by low concentrations of nitrate nitrogen and a synergistic inhibiting effect was found between nitrate in combination with zinc or cobalt. Other elements tested had no effect on the formation of perithecia except at very high concentrations.

Coumarin, p-dichlorobenzene, nucleic acid and maleic acid hydrazide, which affect cellular division in plants, did not inhibit the formation of perithecia but the latter two compounds seemed to inhibit the maturation of ascospores. Cinnamic acid and phloretin, which have been isolated from apple leaves, had little effect on the formation of perithecia.

BLACK ROOT ROT OF SUNFLOWERS IN URUGUAY CAUSED BY *SCLEROTIUM BATATICOLA* TAUB.

W. E. Sackston, Plant Pathology Laboratory, Winnipeg, Manitoba.

Dead sunflower plants, apparently affected by root rot early in their development, were found in approximately 25 per cent of 117 fields examined in Uruguay in January and February, 1957. Only a few plants were affected in most fields; from 1 to 10 per cent of the plants were involved in 5 fields.

Diseased plants were stunted. The stem was entirely or largely black. The root system was restricted in size. The roots were dark externally and gray to greenish-gray internally. The roots of some affected plants were dry and brittle; on other plants they were rotted and soft. Adjacent apparently healthy plants had vigorous root systems, and the roots were pale externally and white internally.

Microsclerotia of *Sclerotium bataticola* Taub. were visible even with the naked eye in cortex and stele of roots, and in the pith of stems, as well as on the surface of subepidermal tissues of some affected plants. The fungus was isolated regularly from the roots and lower stem portions of affected plants even in the absence of visible microsclerotia. Colonies of *Fusarium oxysporum Schlecht,* often developed superficially from tissue pieces in the center of *S. bataticola* colonies in plates.

Sunflowers at various stages of growth were inoculated in the greenhouse at La Estanzuela, Uruguay. Inoculations on older plants were made by introducing the organism into wounds near the base of the stem. Seedlings were inoculated by dipping the roots in suspensions of the fungus in water. *F. oxysporum* proved pathogenic to seedlings, but less so than *S. bataticola,* and the symptoms were different from those seen in the field. *S. bataticola* proved pathogenic in both stem and root inoculations, but symptoms resulting from root inoculation of seedlings were more like those seen in the field.

S. bataticola cultures isolated from Uruguayan material proved pathogenic in similar inoculation experiments made on sunflowers in controlled-environment cabinets at Winnipeg. The fungus was reisolated from inoculated plants, but the symptoms produced were not the same as those seen in South America, possibly because temperatures were appreciably lower in the Winnipeg tests.

S. bataticola had not been reported from sunflowers in Uruguay before this work was done. Although the root rot of young sunflowers appeared to be of limited economic importance, the same pathogen was associated with an extremely important disease of mature sunflowers, which is being investigated further in Argentina.

S. bataticola has been reported on field beans and soybeans in Southern Ontario, but its temperature requirements make it quite unlikely that this fungus will constitute a threat to sunflower production in Canada.

THE DEGREE OF STUNTING OF WHEAT BY *HELMINTHOSPORIUM SATIVUM* IN RELATION TO RECOVERY

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Wheat plants which are severely stunted in the early seedling stage as a result of inoculation of the seed with *Helminthosporium sativum* may recover under favorable conditions for growth. Recovery has been found to proceed to the point where inoculated plants have significantly larger later leaves, more leaves and finally yield more grain than inoculated plants. When plants were selected on the basis of areas of the first leaves, it was found that recovery was greatest in plants originally most stunted, where competition was limited to equally stunted plants. Recovery was inversely proportional to the initial degree of stunting. Recovery does not appear to depend on differential root development, since roots as well as leaves are stunted by *H. sativum*.

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